IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: VAZQUEZ DEL MERCADO, Luis Francisco; SILVA-GALVAN, Luis David

SERIAL NO.:

FILED: Herewith

TITLE: SILVER-BARIUM LEAD ALLOY FOR LEAD-ACID BATTERY GRIDS

PRELIMINARY AMENDMENT

Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

In conjunction with the filing of the present application, and prior to an initial Official Action on this matter, please amend the above-identified application as follows:

IN THE SPECIFICATION

On pages 1-2, the paragraph beginning with "Great attention" and ending with "electrical contact.", please substitute as follows:

Great attention over the years has been given to the type of alloys used for manufacturing positive and negative grids. The selection of appropriate levels of elements for the battery grids involves considerations of grid-production capability, economic feasibility, and the metallurgical and electrochemical properties of the resulting alloys. Lead alloys must provide such properties as stiffness, strength, grain refinement, hardness, corrosion resistance, processability and conductivity. From several years of experience all around the world, it is well known that the ultimate life of a lead-acid battery is largely determined by the positive grids. According to Taylor et al (U.S. Patent 6,117,594), several factors contribute to making the positive grid the life limiting component of the battery: 1) highly oxidizing potential created by the presence of the positive active material and sulfuric acid, 2) high temperature accelerating the grid oxidation due to the battery being enclosed in a confined space in close proximity to the ICE engine, 3) relatively poor conductivity of the active material placing most of the current carrying burden on the Pb grid member, and 4) relatively poor match of the crystal structure of the active material compared to the Pb grid to which it must be in electrical contact.

On page 6, the paragraph beginning with "Field testing" and ending with "said cells.", has been amended as follows:

Field testing consisting in evaluations of batteries made out of the alloy claimed in patent WO 97/30183 has shown several drawbacks. The most common failure being cell shortening due to positive grid growth after some rather limited usage, causing this electrode to touch the bottom of the strap that joins together the plates which form the negative electrode of said cells.

On page 8, the paragraph beginning with "Fig. 1" and ending with "versus time.", has been amended as follows:

Fig. 1 is a graph of hardness test results performed at room temperature on battery grids manufactured from three different alloys, plotting the degree of hardness versus time.

On page 8, the paragraph beginning with "Fig. 2" and ending with "of alloy.", has been amended as follows:

Fig. 2 is a graph of overcharge corrosion test results performed during seven days at 60 °C on battery grids manufactured from three different alloys, plotting the grid weight losses per unit of area of the tested grid versus the type of alloy.

On page 8, the paragraph beginning with "Fig. 3" and ending with "grids vs. time.", has been amended as follows:

Fig. 3 is a graph of corrosion evaluation using impedance measurements performed on battery grids manufactured from three different alloys, plotting the ohmic drop across grids vs. time.

IN THE CLAIMS

In Claim 1, the claim has been amended as follows:

1. (Amended) A lead alloy for lead acid-battery grids, comprising about 0.05-0.07 %wt calcium; about 0.9-1.3 wt % tin; about 0.006-0.010%wt silver; about 0.0100-0.0170 wt% barium and about 0.015-0.025 wt% aluminum with the balance being lead.

In Claim 3, the claim has been amended as follows:

3. (Amended) A lead-acid battery comprising a container with a plurality of cells and an electrolyte contained in the cells, each cell comprising a plurality of positive and negative grids, said positive grids comprising about 0.05-0.07 wt % calcium; about 0.09-1.3 wt % tin; about 0.0060-0.0100 %silver; about 0.0100-0.0170 wt% barium and about 0.015-.025 wt% aluminum with the balance lead.

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TITLE: SILVER-BARIUM LEAD ALLOY FOR LEAD-ACID BATTERY GRIDS

REMARKS ON PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In this preliminary amendment, please consider the following remarks in conjunction with the amendments to the above-identified application as follows:

REMARKS

The present Preliminary Amendment has been entered for the purpose of placing the application into a more proper U.S. format. In particular, certain grammatical and idiomatic inconsistencies have been corrected by amendment to the specification, and the application is corrected for certain typographical errors found in the originally submitted application. No new matter has been added by these amendments.

The claims have been amended so as to conform with U.S. requirements.

Applicant respectfully requests that the present Amendment be entered prior to an initial Official Action on the present application.

Respectfully submitted,

6-1-01
Date

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VERSION WITH MARKINGS TO SHOW CHANGES in the PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In conjunction with the filing of the present application, and prior to an initial Official Action on this matter, please amend the above-identified application as follows:

IN THE SPECIFICATION

On pages 1-2, the paragraph beginning with "Great attention" and ending with "electrical contact.", has been amended as follows:

Great attention over the years has been given to the type of alloys used for manufacturing positive and negative grids. The selection of appropriate levels of elements for the battery grids involves considerations of grid-production capability, economic feasibility, and the metallurgical and electrochemical properties of the resulting alloys. Lead alloys must provide such properties as stiffness, strength, grain refinement, [harness] hardness, corrosion resistance, processability and conductivity. From several years of experience all around the world, it is well known that the ultimate life of a lead-acid battery is largely determined by the positive grids. According to Taylor et al (U.S. Patent 6,117,594), several factors contribute to making the positive grid the life limiting component of the battery: 1) highly oxidizing potential created by the presence of the positive active material and sulfuric acid, 2) high temperature accelerating the grid oxidation due to the battery being enclosed in a confined space in close proximity to the ICE engine, 3) relatively poor conductivity of the active material placing most of the current carrying burden on the Pb grid member, and 4) relatively poor match of the crystal structure of the active material compared to the Pb grid to which it must be in electrical contact.

On page 6, the paragraph beginning with "Field testing" and ending with "said cells.", has been amended as follows:

Field testing consisting in evaluations of batteries made out of the alloy claimed in patent WO 97/30183 has shown several drawbacks. The most common failure [mode] being cell shortening due to positive grid growth after some rather limited usage, causing this electrode to touch the [underneath] bottom of the strap that joins together the plates which form the negative electrode of said cells.

On page 8, the paragraph beginning with "Fig. 1" and ending with "versus time.", has been amended as follows:

Fig. 1 is a graph of hardness test results performed at room temperature on battery grids manufactured from [tree] three different alloys, plotting the degree of hardness versus time.

On page 8, the paragraph beginning with "Fig. 2" and ending with "of alloy.", has been amended as follows:

Fig. 2 is a graph of overcharge corrosion test results performed during seven days at 60 °C on battery grids manufactured from [tree] three different alloys, plotting the grid weight losses per unit of area of the tested grid versus the type of alloy.

On page 8, the paragraph beginning with "Fig. 3" and ending with "grids vs. time.", has been amended as follows:

Fig. 3 is a graph of corrosion evaluation using impedance measurements performed on battery grids manufactured from [tree] three different alloys, plotting the ohmic drop across grids vs. time.

IN THE CLAIMS

In Claim 1, the claim has been amended as follows:

1. (Amended) A lead alloy for lead acid-battery grids, [which essentially consists of] comprising about 0.05-0.07 %wt calcium; about 0.9-1.3 wt % tin; about 0.006-0.010%wt silver; about 0.0100-0.0170 wt% barium and about 0.015-0.025 wt% aluminum with the balance being lead.

In Claim 3, the claim has been amended as follows:

3. (Amended) A lead-acid battery [having] comprising a container with a plurality of cells and an electrolyte contained in the cells, each cell [having] comprising a plurality of positive and negative grids, said positive grids [consisting essentially of] comprising about 0.05-0.07 wt % calcium; about 0.09-1.3 wt % tin; about 0.0060-0.0100 %silver; about 0.0100-0.0170 wt% barium and about 0.015-.025 wt% aluminum with the balance lead.